(12) UK Patent Application (19) GB (11) 2 108 150 A

(21) Application No 8132434
(22) Date of filing 28 Oct 1981
(43) Application published
11 May 1983
(51) INT CL³
C12N 1/16
(52) Domestic classification
C6F 102 F
A2B 315 403 503 604
623 625 BD
(56) Documents cited
GB 1595054
GB 1556584
GB 1426101
(58) Field of search
C6F
(71) Applicant
PA Management
Consultants Limited,
(Great Britain),
Hyde Park House,
60a Knightsbridge,
London, SW1
(72) Inventor
Glyn Michael Tonge
(74) Agent and/or address for
service
Keith W. Nash and Co.,
Pearl Assurance House,
90/92 Regent Street,
Cambridge,
CB2 1B3

(54) Preservation and protection of yeast

(57) Yeast cells are micro-encapsulated in a polymer such as poly β—OH butyrate or pullulan having or modified to have a preselected melting or disintegration temperature above the environmental temperature at which the yeast is to remain preserved or protected, so that the yeast cells can be released by raising the temperature to the pre-selected temperature. The micro-encapsulated yeast cells are preserved or protected against deterioration, e.g., during storage, due to contact with air or moisture. The protected cells can be mixed with other materials e.g. in ready-to-cook foodstuffs such as bread-type mixes.

GB 2 108 150A

SPECIFICATION

Preservation and protection of yeast

This invention relates generally to the preservation and protection of yeast, in particular dried yeast, and more especially to methods of protecting yeast, yeast when so protected and methods of using protected yeast.

According to one aspect of the present invention, there is provided a method of preserving or protecting yeast according to which [illegible] having or modified to have a preselected melting [illegible] to be preserved or protected.

Thus, according to another aspect of the present invention, yeast is provided in the form of micro-encapsulated yeast cells, wherein the micro-encapsulating material is a polymer having or modified to have a preselected melting or disintegration temperature which will enable the yeast cells to be released when the temperature of the yeast is raised to such preselected temperature.

The present invention finds applicability in the food industry, especially in "ready to cook" mixes such as bread-type mixes, in which yeast is conventionally packaged separately from the other already mixed ingredients, and has to be mixed in separately during preparation prior to cooking. This is a disadvantage which can be overcome with the present invention.

Thus, according to still another aspect of the present invention, there is provided a ready-to-cook foodstuffs, such as bread-type mix, which includes in the ingredients yeast in the form of yeast cells micro-encapsulated with a material, more especially a polymer, having or modified to have a pre-selected temperature of melting or disintegration above normal ambient temperature and below the temperature to which the foodstuff is raised for pre-cooking action of the yeast.

Clearly, in foodstuff applications, the encapsulating material will be a polymer which is tasteless and harmless when consumed. Examples of such polymers are poly-B-OH-butyrate and pullulan. The normal melting temperature of the former polymer is 90°C, but this may be lowered by mixing with natural lipids. In this way, a selected melting temperature below 90°C down as low as 5 to 10°C may be obtained. The second polymer, pullulan, when chemically modified by esterification, can have a melting temperature of the order of 70°C. For preparation of bread-type mixes for example, the yeast mixture is raised to a temperature typically of 35 to 40°C to stimulate yeast activity, in which case pullulan may be unsuitable. However, pullulan may be preferred for other foodstuff mixes where yeast activity is stimulated at a higher temperature.

The invention thus provides yeast in the form of micro-encapsulated yeast cells which are preserved or protected against deterioration, e.g. during storage, due to contact with air or moisture and which, in a most important application, can be mixed in with other ingredients in ready-to-cook foodstuffs. In the latter application, the encapsulating material will melt as the temperature of the food-mix is raised to attain the yeast activity level, releasing the yeast cells for normal activity.

Some examples of methods of micro-encapsulation of yeast cells in a polymer will now be described by way of example.

A first method is based on enclosing yeast cells via dispersion in a water-immiscible organic solvent, followed by dispersion in aqueous solution and drying.

Aqueous solution containing yeast cells is dispersed in an organic solvent containing polymer to form a primary emulsion. This emulsion, containing aqueous micro-droplets is then dispersed in an aqueous phase containing protective colloidal substances such as polyvinyl alcohol and surface active agents to form a secondary emulsion. The organic solvent is removed by vacuum drying to give yeast particles coated in a polymer membrane. Organic solvents which can be used are benzene, cyclohexane, methylcyclohexane, methylene dichloride and chloroform.

The microcapsule size can be varied by controlling the concentration of polymer in the organic phase.

A second method utilises a dispersion of yeast cells in a melt of polymer which is sprayed into cool air to form fine grain capsules. Alternatively, yeast cells can be dispersed in polymer dissolved in organic solvent such as benzene, cyclohexane, methylcyclohexane, methylene dichloride and chloroform. The dispersion is then spray dried (conventional spray drying in warm air) to produce coated yeast particles.

A third method is based on phase separation techniques. An aqueous suspension of yeast cells is dispersed in a water-immiscible organic solvent, for example benzene, cyclohexane, methylcyclohexane, methylene dichloride and chloroform containing dissolved polymer. Two phases are formed and to the organic phase containing aqueous micro-droplets, a second organic solvent such as petroleum ether, is added, which is miscible with the first organic solvent but does not dissolved the polymer. The polymer is then concentrated and microcapsules are formed around the aqueous yeast micro-droplets.

Examples of polymers or modified polymers which can be used as the yeast encapsulating material in any of these methods are poly-B-OH-butyrate, possibly modified by addition of lipids to pre-select the melting temperature thereof, and pullulan modified by esterification to pre-select the melting temperature thereof.

Claims (filed on 27th Oct, '82)

1. A method of preserving or protecting yeast wherein yeast cells are micro-encapsulated in a polymer having or modified to have a pre-

selected melting or disintegration temperature above the environmental temperature at which the yeast is to remain preserved or protected.

2. A method according to claim 1, wherein the polymer comprises poly β-OH butyrate.

3. A method according to claim 2, wherein the polymer is mixed with natural lipids.

4. A method according to claim 1, wherein the polymer comprises pullulan.

5. A method according to claim 1, wherein the polymer is chemically modified by esterification.

6. A method according to any one of the preceding claims, wherein yeast cells are enclosed via dispersion in a water-immiscible organic solvent, followed by dispersion in aqueous solution and drying.

7. A method according to claim 6, wherein aqueous solution containing yeast cells is dispersed in an organic solvent containing polymer to form a primary emulsion; the primary emulsion is then dispersed in an aqueous phase containing protective colloidal substances such as polyvinyl alcohol and surface active agents to form a secondary emulsion; and the organic solvent is removed by vacuum drying to give yeast particles coated in a polymer membrane.

8. A method according to claim 6 or 7, wherein the organic solvent comprises one or more of the following: benzene, cyclohexane, methylcyclohexane, methylene dichloride and chloroform.

9. A method according to claim 6, 7 or 8, wherein the microcapsule size is varied by controlling the concentration of polymer in the organic phase.

10. A method according to any one of claims 1 to 5, wherein a dispersion of yeast cells in a melt of polymer is sprayed into cool to air to form fine grain capsules.

11. A method according to any one of claims 1 to 5, wherein yeast cells are dispersed in polymer dissolved in organic solvent such as benzene, cyclohexane, methylcyclo-hexane, methylene dichloride and chloroform; and the dispersion is then spray dried to produce yeast particles.

12. A method according to any one of claims 1 to 5, wherein an aqueous suspension of yeast cells is dispersed in a water-immiscible first organic solvent containing dissolved polymer; the resulting organic phase containing aqueous micro-droplets has added thereto a second organic solvent which is miscible with the first organic solvent but does not dissolve the polymer; and the polymer is then concentrated and microcapsules are formed around the aqueous yeast micro-droplets.

13. A method according to claim 12, wherein the first organic solvent comprises one or more of benzene, cyclohexane, methylcyclohexane, methylene dichloride and chloroform, and the second organic solvent comprises petroleum ether.

14. Micro-encapsulated yeast prepared by the method of any one of the preceding claims.

15. Yeast in the form of micro-encapsulated yeast cells, wherein the micro-encapsulating material is a polymer having or modified to have a pre-selected melting or disintegration temperature which will enable the yeast cells to be released when the temperature of the yeast is raised to such pre-selected temperature.

16. A ready-to-cook foodstuff which includes in the ingredients yeast in the form of yeast cells microencapsulated with a material, more especially a polymer, having or modified to have a pre-selected temperature of melting or disintegration above normal ambient temperature and below the temperature to which the foodstuff is raised for pre-cooking action of the yeast.

17. A foodstuff according to claim 16, comprising a bread-type mix.

18. A material according to claim 15, 16 or 17, wherein the polymer comprises β-OH butyrate.

19. A material according to claim 18, wherein the polymer is mixed with natural lipids.

20. A material according to claim 15, 16 or 17, wherein the polymer comprises pullulan.

21. A material according to claim 20, wherein the polymer is chemically modified by esterification.

Claims Filed on 27/10/82.
Superseded Claims.

New or Amended Claims:—

1. A method of preserving or protecting yeast wherein yeast cells are micro-encapsulated in a polymer having or modified to have a pre-selected melting or disintegration temperature above the environmental temperature at which the yeast is to remain preserved or protected.

2. A method according to claim 1, wherein the polymer comprises poly β-OH butyrate.

3. A method according to claim 2, wherein the polymer is mixed with natural lipids.

4. A method according to claim 1, wherein the polymer comprises pullulan.

5. A method according to claim 1, wherein the polymer is chemically modified by esterification.

6. A method according to any one of the preceding claims, wherein yeast cells are enclosed via dispersion in a water-immiscible organic solvent, followed by dispersion in aqueous solution and drying.

7. A method according to claim 6, wherein aqueous solution containing yeast cells is dispersed in an organic solvent containing polymer to form a primary emulsion; the primary emulsion is then dispersed in an aqueous phase containing protective colloidal substances such as polyvinyl alcohol and surface active agents to form a second emulsion; and the organic solvent is removed by vacuum drying to give yeast particles coated in a polymer membrane.

8. A method according to claim 6 or 7, wherein the organic solvent comprises one or more of the following: benzene, cyclohexane, methylcyclo-hexane, methylene dichloride and chloroform.

9. A method according to claim 6, 7 or 8,

wherein the microcapsule size is varied by controlling the concentration of polymer in the organic phase.

10. A method according to any one of claims 1 to 5, wherein a dispersion of yeast cells in a melt of polymer is sprayed into cool air to form fine grain capsules.

11. A method according to any one of claims 1 to 5, wherein yeast cells are dispersed in polymer dissolved in organic solvent such as benzene, cyclohexane, methylcyclohexane, methylene dichloride and chloroform; and the dispersion is then spray dried to produce yeast particles.

12. A method according to any one of claims 1 to 5, wherein an aqueous suspension of yeast cells is dispersed in a water-immiscible first organic solvent containing dissolved polymer; the resulting organic phase containing aqueous micro-droplets has added thereto a second organic solvent which is miscible with the first organic solvent but does not dissolve the polymer; and the polymer is then concentrated and micro-capsules are formed around the aqueous yeast micro-droplets.

13. A method according to claim 12, wherein the first organic solvent comprises one or more of benzene, cyclohexane, methylcyclo-hexane, methylene dichloride and chloroform, and the second organic solvent comprises petroleum ether.

14. Micro-encapsulated yeast prepared by the method of any one of the preceding claims.

15. Yeast in the form of micro-encapsulated yeast cells, wherein the micro-encapsulating material is a polymer having or modified to have a pre-selected melting or disintegration temperature which will enable the yeast cells to be released when the temperature of the yeast is raised to such pre-selected temperature.

16. A ready-to-cook foodstuff which includes in the ingredients yeast in the form of yeast cells micro-encapsulated with a material, more especially a polymer, having or modified to have a pre-selected temperature of melting or disintegration above normal ambient temperature and below the temperature to which the foodstuff is raised for pre-cooking action of the yeast.

17. A foodstuff according to claim 16, comprising a bread-type mix.

18. A material according to claim 15, 16 or 17, wherein the polymer comprises poly β-OH butyrate.

19. A material according to claim 18, wherein the polymer is mixed with natural lipids.

20. A material according to claim 15, 16 or 17, wherein the polymer comprises pullulan.

21. A material according to claim 20, wherein the polymer is chemically modified by esterification.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained